REMARKS

Claims 6-46 were pending at last examination. Claims 6-9, 31-39, and 43-45 have been amended. Claims 47-54 have been added. No claims were cancelled.

Rejection Clarification

Claims 6-46 were pending at last examination, however, only claims 6-30 were examined. Applicant paid for the new claims with check number 4822 along with the response to the Office Action filed on 5/9/06. However, in the response to the Office Action filed on 5/9/06, Applicant erroneously indicated in the remarks section that only claims 6-30 were pending. Applicant wishes to apologize for the confusion and respectfully requests that pending claims 6-46 be examined.

Claims 22, 23, and 24 were rejected in part based on "Cisco, create a PVC, page 15". Applicant respectfully submits that "Cisco-Radius Commands" is silent regarding PVC; in fact, "Cisco-Radius Commands" is only 3 pages long. Similarly, claim 24 was also rejected in part based on "Cisco, configure structure, page 56". Applicant respectfully submits that "Cisco-Radius Commands" is silent regarding configure structure; in fact, "Cisco-Radius Commands" is only 3 pages long. Applicant assumes the Office Action is referring to "Cisco – ATM commands", but this is not indicated in the Office Action. Applicant respectfully requests clarification if these rejections are maintained.

Claim Rejections – 35 USC 112

Claim 1 is rejected under 35 USC 112 second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Office Action specifically objects to "a first binding data structure in the memory which binds the first network interface to the first sub-interface data structure." The Office Action interprets any data structure as being the first binding data structure and any network interface as the first network interface.

Applicant respectfully submits that claim 1 was cancelled in previous responses. Therefore, Applicant assumes that claim 6, not claim 1, is rejected under 35 USC 112, as claim 6 included this language.

Applicant respectfully submits that amendments to claim 6 have overcome this rejection.

Rejections under 35 USC §103(a)

Applicant's claims 6-30 have been rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,825,772 issued to Dobbins et al. in view of Cisco et al ("Radius Commands"). Applicant does not admit Dobbins is prior art and reserves the right to swear behind the reference at a later date.

Claim 29

Applicant's claim 29 is directed towards a subscriber management system comprising:

> a **network device** including an electronic memory encoded with **multiple respective virtual routers** in the memory, said respective virtual routers including corresponding respective network databases which include respective control information, said **respective virtual routers respectively including at least one respective network interface to a respective network domain**;
>
> respective **subscriber records** in an electronic memory that include respective **information as to network domains** to which respective **subscriber end stations of respective subscribers may be bound**;
>
> multiple respective sub-interface data structures in the electronic memory respectively associated with respective subscribers;
>
> a computer program in electronic memory that searches respective subscriber records to identify respective network domains that may be accessed by respective subscriber ends stations of respective subscribers; and
>
> respective **binding data structures that respectively bind respective sub-interface data structures associated with respective subscribers to respective network interfaces to respective network domains identified from searching respective subscriber records**.

Thus, claim 29 requires multiple virtual routers in a network device each including a network interface to a network domain and where subscriber records include information as to network domains to which subscriber end stations of respective subscribers may be bound. Further, claim 29 requires binding data structures that respectively bind respective sub-interface data structures associated with respective subscribers to respective network interfaces to respective network domains identified form searching respective subscriber records.

The combination of Dobbins and Radius Commands does not describe the above limitations. Dobbins describes a distributed switching model where each switch is capable of processing all aspects of call processing and switching functionality (col. 2, lines 39-42). Each switch in the domain maintains a "virtual directory" which contains complete mappings of all known users within the domain (col. 3 lines 60-67 thru col. 4 lines 1-9). The switched domain also allows interconnectivity between legacy networks through the use of "virtual router agents" (col. 6, lines 35-38). The virtual router agents process the route and service advertisements they receive from multi-protocol routers and servers attached to the switch (col. 6, lines 35-40). The switch then summarizes and collapses the external networks, routes, and services to only the "best" routes in order to provide a best path to a network or server outside of the switched domain (col. 6, lines 40-46). Dobbins also describes a switch using Address Resolution Protocol (ARP) to resolve physical hardware addresses that are located remotely from the switch. However, the "virtual router agent" of Dobbins does not correspond to a unique network domain. Rather, the "virtual router agent" is located within a switch of the switched domain and is used for resolving the reachability of destinations that are outside the switched domain.

Radius Commands describes configuring a router to transmit all outgoing RADIUS commands through a specific router interface (Radius Commands, p.1). For example, Radius Commands describes configuring a router to transmit all outgoing RADIUS commands through a specific router interface (Radius Commands, p.1). As another example, Radius Commands describes setting authentication and encryption keys

for all RADIUS communications between a router and the RADIUS daemon (Radius Commands, p. 2).

Nonetheless, neither Dobbins nor Radius Commands describe **multiple virtual routers within a network device** where **each** virtual router includes at least one network interface for a **respective network domain** and where subscriber records include information as to which respective **subscriber end stations of respective subscribers may be bound**. Further, Dobbins does not describe **binding data structures that respectively bind sub-interface data structures associated with respective subscribers to respective network interfaces to respective network domains identified from searching respective subscriber records**.

By way of example and not limitation, the network device of Applicant may bind a layer 1/2 connection associated with a subscriber to a particular virtual network machine according to an associated subscriber record and dynamically change the binding to another virtual network machine according to a change in the subscriber record. As another example, the subscriber record may provide multiple possible binding options for the subscriber. For instance, a subscriber record may specify the subscriber being bound to a particular virtual network machine which provides network access to a corporate private network during business hours while also specifying the subscriber to be bound to a different virtual network machine that provides network access to a different network during non-business hours (Spec, page 22, lines 23-29). Thus, the bindings may be dynamically changed.

Claim 24

Applicant's claim 24 is directed towards a method of "creating links between multiple **subscriber end stations and multiple network domains** comprising:

> providing a network device including an electronic memory encoded with **multiple respective virtual routers**, said respective virtual routers including respective corresponding network databases which include respective control information, said **respective virtual routers respectively each including at least one respective network interface for a respective network domain**;

providing respective **subscriber records** in an electronic memory that **include respective information as to network domains to which respective subscriber end stations of respective subscribers may access**;

providing multiple respective **sub-interface data structures** in the electronic memory respectively **associated with respective subscribers**;

searching respective subscriber records to identify respective network domains that may be accessed by a respective subscriber end station of a respective subscriber; and

creating respective **binding data structures that respectively bind respective sub-interface data structures respectively associated with respective subscribers to respective network interfaces for respective network domains identified from searching respective subscriber records**.

Thus, Applicant's claim 24 requires **multiple virtual routers** within a network device where each virtual router includes at least one network interface for a respective network domain and where subscriber records include respective information as to which network domains respective subscriber end stations of respective subscribers may access. Claim 24 further requires providing multiple sub-interface data structures associated with respective subscribers and searching subscriber records to identify respective network domains that may be accessed by a respective subscriber end station of a respective subscriber.

The combination of Dobbins and Radius Commands does not describe the above limitations. As per above, neither Dobbins nor Radius Commands describe **multiple virtual routers within a network device** where **each** virtual router includes at least one network interface for a **respective network domain** and where subscriber records include information as to which respective **subscriber end stations of respective subscribers may be bound**. Further, Dobbins does not describe **binding data structures that respectively bind sub-interface data structures associated with respective subscribers to respective network interfaces to respective network domains identified from searching respective subscriber records**.

By way of example and not limitation, the network device of Applicant may bind a layer 1/2 connection associated with a subscriber to a particular virtual network

machine according to an associated subscriber record and dynamically change the binding to another virtual network machine according to a change in the subscriber record. As another example, the subscriber record may provide multiple possible binding options for the subscriber. For instance, a subscriber record may specify the subscriber being bound to a particular virtual network machine which provides network access to a corporate private network during business hours while also specifying the subscriber to be bound to a different virtual network machine that provides network access to a different network during non-business hours (Spec, page 22, lines 23-29). Thus, the bindings may be dynamically changed.

Claim 18

Applicant's claim 18 is directed towards a mechanism of creating a link in a network domain where "a network device including an electronic memory encoded with a **first virtual router** which includes at least **one first network interface** and with **a second virtual router** which includes at least **one second network interface**" is provided, a first and second "sub interface data structure encoded in the electronic memory" is provided, and the "**first network interface" is bound to the "first sub-interface data structure**" and the "**second network interface" is bound to the "second sub-interface data structure**.". Thus, applicant requires **two virtual routers within a network device**, with **each virtual router including a separate network interface and bound to a separate sub-interface data structure**.

The combination of Dobbins and Radius Commands does not describe the above limitations. As per above, neither Dobbins nor Radius Commands describe **two virtual routers within a network device with each virtual router including a separate network interface and bound to a separate sub-interface data structure**.

Claims 6, 8, 10

Applicant's amended claim 6 is directed towards a network device comprising "at least one virtual router" in memory where the "at least one virtual router including a

network interface, wherein the at least one **virtual router is associated to an unique network domain**", a "sub-interface data structure in the memory; and a binding data structure in the memory which **binds the network interface to the sub-interface data structure**". Thus, Applicant's amended claim 6 requires a virtual router in memory which includes a network interface, a **sub-interface data structure in the memory that is bound to the network interface of the virtual router by a binding data structure**, where the virtual router corresponds to a unique network domain.

Applicant's amended claim 8 is directed towards an electronic coded memory with "at least one virtual router, said at least one virtual router including a network interface, **where the at least one virtual router is associated to an unique network domain**; a sub-interface data structure; and a binding data structure which binds the **first network interface to the first sub-interface data structure**". Thus, Applicant's amended claim 8 requires a virtual router in memory which includes a network interface, a **sub-interface data structure in the memory that is bound to the network interface of the virtual router** by a binding data structure, where the virtual router corresponds to a unique network domain.

Applicant's claim 10 is directed towards "creating a link in at least one **network domain**" where "a network device including an electronic memory encoded with at least one **virtual router** which includes at least one network interface" is provided, and "at least one sub-interface data structure" is bound to "the at least one network interface".

The combination of Dobbins and Radius Commands does not describe the above limitations. The combination would have the switched domain that uses "virtual router agents" to process route and service advertisements and uses ARP to learn physical hardware addresses of remote switches while forcing RADIUS commands to be transmitted out a particular interface. However, the combination does not describe **a binding data structure that binds a network interface of a virtual router to a sub-interface data structure, where the virtual router corresponds to a unique network domain**.

The Applicant respectfully submits that the dependant claims are allowable for at least the reason that they are dependent on an allowable independent claim.

CLAIMS NOT EXAMINED

As previously described, claims 31-46 were added during the last response (Office Action response 5/9/2006) but were not examined. Applicant respectfully submits that claims 31-46 are not described by the combination of Dobbins and Radius Commands.

Claim 39

Applicant's amended claim 39 is directed towards an apparatus comprising:

a **single network device** including,
a set of one or more processors;
a first plurality of ports to communicate packets of a plurality of subscribers;
a second plurality of ports to communicate packets; and
a machine-readable medium having stored therein a set of instructions to cause the set of processors to,
instantiate a **plurality of virtual network machines**, wherein the plurality of virtual network machines are virtually independent but **share a set of physical resources** within the single network device, wherein each of the plurality of **virtual network machines is one of a virtual router and a virtual bridge**, and wherein **each of the plurality of virtual network machines belong to a network domain**,
receive subscriber records associated with the plurality of subscribers, wherein **each of the plurality of subscribers are associated with a virtual circuit** on one of the first plurality of ports, wherein **each of the first and second plurality of ports is associated with one or more sub-interfaces**, and wherein each of the virtual circuits is associated with one of the sub-interfaces associated with the one of the first plurality of ports that the virtual circuit is on, and
dynamically bind a set of one or more **network interfaces** of each of the virtual network machines **to a set of one or more of the sub-interfaces**, such that each of the virtual circuits is communicatively coupled with one of said plurality of virtual network machines based on the **subscriber record of the subscriber associated with that virtual circuit** and such that at least some of the virtual network machines are

communicatively coupled to one of the second plurality of ports, wherein the bindings are represented with a plurality of data structures.

Thus, amended claim 39 requires a single network device to instantiate a plurality of virtual network machines that share a set of physical resources of the network device, where each virtual network machine is either a virtual router or a virtual bridge belonging to a network domain. Furthermore, claim 39 requires the network device to receive subscriber records associated with a plurality of subscribers, where each of the subscribers are associated with a virtual circuit on one of a plurality of ports, wherein each port is associated with one or more sub-interfaces. Furthermore, claim 39 requires a set of one or more network interfaces of each of the virtual network machines to be dynamically bound to a set of one or more sub-interfaces such that each of the virtual circuits is communicatively coupled with one of the plurality of virtual network machines based on the subscriber record of the subscriber associated with that virtual circuit.

The combination of Dobbins and Radius Commands does not describe the above limitations. As per above neither, Dobbins nor Radius Commands describe, in a single network element, **dynamically binding a set of one or more network interfaces of each of a plurality of virtual network machines to a set of one or more sub-interfaces**. Nor does the combinations describe a "**plurality of virtual network machines**, wherein the plurality of virtual network machines are virtually independent but **share a set of physical resources** within the single network device" or "the plurality of **virtual network machines is one of a virtual router and a virtual bridge**, and wherein **each of the plurality of virtual network machines belong to a network domain** ..."

Claim 31

Claim 31 is directed to a network device comprising "memory; I/O; at least one **virtual bridge** in the memory" which includes "a first network interface"; a "first sub-interface data structure" that is bound to the "first network interface" by a "first binding structure".

The combination of Dobbins and Radius Commands does not describe the above limitations. As per above, neither Dobbins nor Radius Commands describe **a virtual bridge** with a network interface that is bound to a sub-interface data structure.

The combination of Dobbins and Radius Commands would have the switched domain that uses "virtual router agents" to process route and service advertisements and uses ARP to learn physical hardware addresses of remote switches while forcing RADIUS commands to be transmitted out a particular interface. However, the combination does not describe **a virtual bridge**, as claimed, with a network interface that is bound to a sub-interface data structure.

Claim 33

Applicant's claim 33 is directed towards an apparatus comprising:

> a **single network device** including,
>
> a set of one or more processors;
>
> a first physical interface, the first physical interface coupled to a network; and
>
> a machine-readable medium having stored therein a set of instructions to cause the set of one or more processors to **instantiate a first virtual router comprising a network interface and a first database**, to instantiate a **second virtual router** comprising a network interface and a second database, and to bind with a data structure the first virtual router network interface to the first physical interface, wherein the **first virtual router routes packets according to the first database within a first network domain** through the first virtual router network interface and the first physical interface, the **second virtual router routes packets according to the second database within a second network domain**.

As previously described, the combination of Dobbins and Radius Commands does not teach or suggest **multiple virtual routers within a single network device** where each **virtual router belongs to separate network domains**.

Claim 35

Applicant's claim 35 is directed towards an apparatus comprising:

> a **single network device** including,
>
> a set of one or more processors; and
>
> a machine-readable medium having stored therein a set of instructions to cause the set of one or more processors to **instantiate a first virtual router comprising a network interface and a first database**, to instantiate **a second virtual router** comprising a network interface and a second database, and to bind with a data structure the first **virtual router network interface to a first virtual circuit**, wherein the **first virtual router routes packets according to the first database within a first network domain** through the first virtual router network interface and the first virtual circuit and **the second virtual router routes packets according to the second database within a second network domain**.

As previously described, the combination of Dobbins and Radius Commands does not teach or suggest **multiple virtual routers within a single network device** where each **virtual router belongs to separate network domains**.

Claim 37

Applicant's claim 37 is directed towards an apparatus comprising:

> a **single network device** including,
>
> a set of one or more processors; and
>
> a machine-readable medium having stored therein a set of instructions to cause the single network device to instantiate a **first virtual bridge** comprising a network interface and a first database, to instantiate a **second virtual bridge** comprising a network interface and a second database, and to **bind with a data structure the first virtual bridge network interface to a first virtual circuit**, wherein the **first virtual bridge switches packets according to the first database within a first network domain** through the first virtual bridge network interface and the first virtual circuit and **the second virtual bridge switches packets according to the second database within a second network domain**.

As previously described, the combination of Dobbins and Radius Commands does not teach or suggest **multiple virtual bridges within a single network device** where each **bridge switches packets within separate network domains**.

The Applicant respectfully submits that the dependant claims are allowable for at least the reason that they are dependent on an allowable independent claim.

NEW CLAIMS

Claims 47-54 have been added. Applicant respectfully submits that the new claims are in condition for allowance. In particular, new independent claim 47 is directed towards an apparatus comprising:

Claim 47

An apparatus comprising:

a **single network device** including,

a set of one or more processors;

a plurality of ports to communicate a **plurality of independent information flows of packets through the single network device between a plurality of end stations**; and

a machine-readable medium having stored therein a set of instructions to cause the set of processors to,

instantiate a **plurality of virtual network machines** to forward the plurality of information flows through the single network device, wherein the plurality of virtual network machines are virtually independent but **share a set of physical resources** within the single network device, wherein each of the plurality of **virtual network machines is one of a virtual router and a virtual bridge**, wherein the **plurality of virtual network machines belong to different network domains with accounting for different administrative authorities**, wherein each of the virtual network machines include one or more network interfaces, and wherein each of the plurality of ports is associated with one or more sub-interface data structures, and

dynamically bind, with a plurality of binding data structures, the **network interfaces** of each of the virtual network machines to **different ones of the sub-interface data structures** to **couple each of the plurality of information flows to a currently appropriate one of the plurality of virtual network machines** based on **current authorization of that information flow**, and wherein the bindings are dynamic based on a change in the authorization of each of the plurality of information flows.

Thus, amended claim 47 requires a single network device to instantiate a plurality of virtual network machines that share a set of physical resources of the network device, where each virtual network machine is either a virtual router or a virtual bridge belonging to a network domain. Furthermore, claim 47 requires a set of one or more network interfaces of each of the virtual network machines to be dynamically bound to a set of one or more sub-interfaces such that couple each of the plurality of information flows to a currently appropriate one of the plurality of virtual network machines based on current authorization of that information flow.

The combination of Dobbins and Radius-Commands does not describe the above limitations. As per above, neither Dobbins nor Radius Commands describe, in a single network element, **dynamically binding a set of one or more network interfaces of each of a plurality of virtual network machines to a set of one or more sub-interfaces**. Nor does the combinations describe a "**plurality of virtual network machines**, wherein the plurality of virtual network machines are virtually independent but **share a set of physical resources** within the single network device" or "the plurality of **virtual network machines is one of a virtual router and a virtual bridge**, and wherein **each of the plurality of virtual network machines belong to a network domain** ..."

The Applicant respectfully submits that the dependant claims 48-54 are allowable for at least the reason that they are dependent on allowable independent claim 47.

SUMMARY

Applicant respectfully submits that the rejections have been overcome by the amendments and remarks, and that the Claims as amended are now in condition for allowance. Accordingly, Applicant respectfully requests the rejections be withdrawn and the Claims as amended be allowed.

Invitation for a telephone interview

The Examiner is invited to call the undersigned at 408-720-8300 (Pacific Time) if there remains any issue with allowance of this case.

Charge our Deposit Account

Please charge any shortage to our Deposit Account No. 02-2666.

Respectfully submitted,
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: Sept 21, 2006

Eric S. Replogle
Reg. No. 52,161

12400 Wilshire Boulevard
Seventh Floor
Los Angeles, California 90025-1026
(408) 720-8300